

CHAPTER 10 Molecular Biology of the Gene

Chapter Objectives

Opening Essay

Explain how a herpesvirus invades a cell and causes disease.

The Structure of the Genetic Material

- 10.1 Describe the experiments of Griffith, Hershey, and Chase, which supported the idea that DNA was life's genetic material.
- 10.2–10.3 Compare the structures of DNA and RNA.
- 10.3 Explain how Chargaff's rules relate to the structure of DNA.

DNA Replication

- 10.4 Explain how the structure of DNA facilitates its replication.
- 10.5 Describe the process of DNA replication. Describe the mechanisms that correct errors caused by environmental damage or errors from replication.

The Flow of Genetic Information from DNA to RNA to Protein

- 10.6 Describe the locations, reactants, and products of transcription and translation.
- 10.7–10.8 Explain how the “languages” of DNA and RNA are used to produce polypeptides.
- 10.9 Explain how mRNA is produced using DNA.
- 10.10 Explain how eukaryotic RNA is processed before leaving the nucleus.
- 10.11 Relate the structure of tRNA to its functions in the process of translation.
- 10.12 Describe the structure and function of ribosomes.
- 10.13 Explain how translation begins.
- 10.14 Describe the step-by-step process by which amino acids are added to a growing polypeptide chain.
- 10.15 Diagram the overall process of transcription and translation.
- 10.16 Describe the major types of mutations, causes of mutations, and potential consequences.

Microbial Genetics

- 10.17 Compare the lytic and lysogenic reproductive cycles of a phage.
- 10.18 Compare the structures and reproductive cycles of the mumps virus and a herpesvirus.
- 10.19 Describe three processes that contribute to the emergence of viral disease and note examples of each.
- 10.19 Explain why RNA viruses tend to have an unusually high rate of mutation.
- 10.20 Explain how the AIDS virus enters a host cell and reproduces.
- 10.21 Describe the structure of viroids and prions and explain how they cause disease.
- 10.22 Define and compare the processes of transformation, transduction, and conjugation.
- 10.23 Describe the roles of bacterial F factors. Define a plasmid and explain why R plasmids pose serious human health problems.